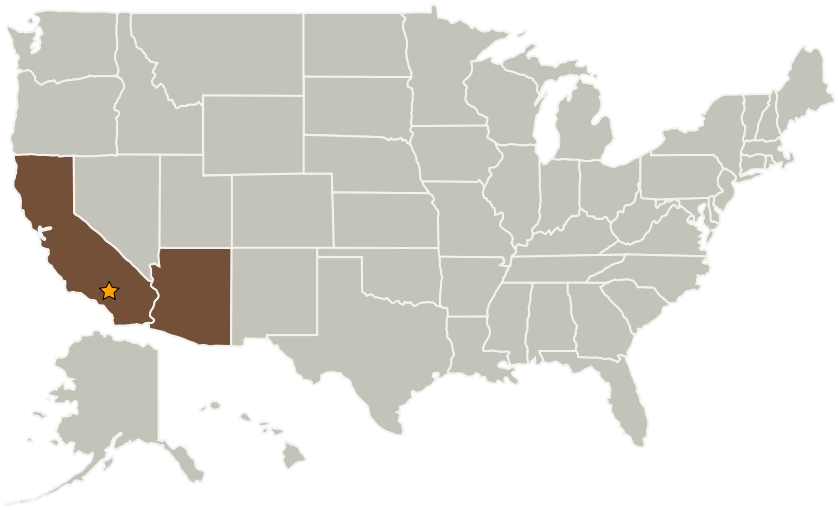
Adaptive Feedfoward Feedback Control Framework, Phase II

Completed Technology Project (2009 - 2011)

Project Introduction

An Adaptive Feedforward and Feedback Control (AFFC) Framework is proposed to suppress the aircraft's structural vibrations and to increase the resilience of the flight control law, in the presence of AE/ASE interactions. Specifically, the adaptive feedforward controller is designed to reduce any atmospheric induced structural vibrations of the aircraft. The adaptive feedback controller is applied as an additive perturbation of the flight control system to suppress any undesired AE/ASE interactions, and prevent the onset of Flutter/Limit Cycle Oscillation (LCO) instabilities within the flight envelope of a flexible aircraft. The proposed research effort fits very well within the scope of the NASA Dryden Flight Research Center topic "A1.10 Adaptive Structural Mode Suppression," specifically within the Integrated Resilient Aircraft Control (IRAC) effort under the Aviation Safety Program. This research will help the original flight control system to robustly recover from or adjust easily to any unforeseen change during its normal operation due to AE/ASE interactions. In addition, practical concerns will deal with the minimal interference with the original rigid-body controller, as well as its feasible implementation using the standard controller's sampling rate frequency.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
ZONA Technology, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Scottsdale, Arizona

Primary U.S. Work Locations	
Arizona	California

Project Transitions

February 2009: Project Start

February 2011: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.2 Reasoning and Acting
    - TX10.2.6 Fault Response